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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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SALTAMAR INNOVATIONS
30 FERN LANE
SOUTH PORTLAND, ME 04106

EXAMINER
LAROSE, COLIN M

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/001,861	POHJOLA, TEEMU	
	Examiner	Art Unit	
	Colin M. LaRose	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on ____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-48 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) 1-48 is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 19 November 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 203,503,604,804.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. Figures 1-4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. The following sections of 37 CFR §1.75(a) and (d)(1) are the basis of the following objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.
>
> (d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

3. Claims 32-43 are objected to under 37 CFR §1.75(a) and (d)(1) as failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention.

Regarding claims 32, 35, 38, and 41, there is insufficient antecedent basis for "the evaluation means." Correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3, 5-7, 15-17, 25, 28, 30, 32, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,398,069 by Huang et al. ("Huang") in view of DCT-Based Codebook Design for Vector Quantization of Images by Hsieh.

Regarding claims 1 and 28, Huang discloses an encoding method (figure 4) for compressing data, the method comprising the steps of:

(a) encoding the data to produce encoded data (VQ 70 in stage 1 – encodes data 59);

(b) forming difference data between the data and the encoded data (adder 78 in stage 1 – forms difference between data 59 and encoded data CV_1);

(c) dividing the difference data into one or more primary blocks, forming difference blocks (i.e. the image is initially divided into blocks, so all the data is grouped into blocks during compression processing – see figure 2 and column 8, line 65 through column 9, line 22);

(d) using a selected codebook re-encoding a difference block to produce an encoded difference block (VQ 70 of stage 2 – utilizes selected codebook 74 to encode the difference blocks R_1);

(e) calculating a following difference block between said difference block and the encoded difference block, forming secondary difference blocks (adder 78 in stage 2 – forms

"following" difference block R_2 between difference block R_1 and encoded difference block CV_2);

(f) iteratively repeating steps d, e and f, until a desired level of compression is achieved (i.e. the re-encoding of successive stages is iterated until a desired compression level, measured by distortion, is achieved – see column 9, lines 53-60 and column 10, lines 18-43; see also figure 5);

(g) wherein said step f is preformed for a plurality of selected primary and secondary difference blocks (i.e. step f is performed for a plurality of blocks at each successive stage of compression);

(h) wherein the codebook for said step d is selected for each iteration from a plurality of codebooks (i.e. a different codebook, among N codebooks, is selected for each stage), at least one of said codebooks contains codevectors trained with training difference material (column 9, lines 33-50: the LBG algorithm is utilized to train the codebooks, and at least one of the codebooks is trained with "residual vectors from the previous training set").

Huang is silent to "wherein prior to the training, said training difference material is preprocessed for individually adapting frequency distribution of at least one of said codevectors for weighting to particular portions of the data."

Hsieh discloses a method of designing VQ codebooks using a modification of the standard LBG algorithm. In particular, Hsieh discloses that prior to the training phase of designing a codebook, the image data is processed using a DCT transform (see § III). Then, the coefficients are arranged in a tree format, wherein the coefficients with the highest variance are

at the top of the tree (see figure 1). The tree is arranged as such because typically the low-frequency features, which contain the most useful information, exhibit the highest variance (see § V.A). Thus, the low-frequency coefficients are "weighted" more than the high-frequency coefficients. From this teaching, it can be said that converting the image into DCT coefficients prior to training essentially preprocesses the image for "individually adapting" the frequency distribution of the codevectors to be trained so that particular portions of the data exhibiting high variance are weighted more heavily than other portions.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Huang by Hsieh to achieve the claimed invention since Hsieh discloses that using the DCT coefficients of image data to "individually adapt frequency distribution of at least one of said codevectors" prior to training a codebook, as claimed, is an advantageous way to train a codebook.

Regarding claims 3 and 30, Huang discloses a plurality of codebooks is used in said step d (i.e. codebooks 1 through N).

Regarding claims 5 and 15, Hsieh discloses the preprocessing of the training material is made using discrete cosine transform (see § III).

Regarding claim 6 and 16, Hsieh discloses the preprocessing of the training material is made using a functional transform (see § III).

Regarding claim 7 and 17, Huang discloses the steps of evaluating the cost of a repetition using a cost function which produces a cost result, and deciding if to perform the next repetition

based on the basis of said result (i.e. decision to perform the next repetition is based on the cost function evaluated at the distortion calculators 80).

Regarding claim 25, the combination of Huang and Hsieh includes at least at one repetition the difference blocks are preprocessed before encoding (i.e. a codebook is designed for each repetition, and all the codebooks are preprocessed pursuant to Hsieh's teachings).

Regarding claims 32 and 38, Huang discloses a cost function, which calculates the cost of using the additional repetition (i.e. decision to perform the next repetition is based on the cost function evaluated at the distortion calculators 80).

6. Claims 2, 4, 10-12, 20-22, 26, 27, 29, 31, 35, 41, and 44-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Hsieh as applied to claim 1 above, and further in view of U.S. Patent 5,692,012 by Virtamo et al. ("Virtamo").

Regarding claims 2 and 29, Huang is silent to at least at one of said repetitions the difference blocks are divided into sub-blocks at least one of which to be used as difference blocks at a subsequent repetition, since all of Huang's blocks are of uniform size.

Virtamo discloses a modification to multistage VQ, wherein the difference blocks of successive stages are divided into sub-blocks (see figures 2 and 5). Virtamo discloses that creating successively smaller blocks to process improves coding accuracy and efficiency (column 4, lines 42-63).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Huang and Hsieh by Virtamo to divide the difference blocks into sub-blocks, as

claimed, since Virtamo discloses that this technique improves the accuracy and efficiency of multistage VQ encoding.

Regarding claims 4 and 31, Huang discloses a plurality of codebooks is used in said step d (i.e. codebooks 1 through N).

Regarding claim 26, the combination of Huang and Hsieh includes at least at one repetition the difference blocks are preprocessed before encoding (i.e. a codebook is designed for each repetition, and all the codebooks are preprocessed pursuant to Hsieh's teachings).

Regarding claim 10 and 20, Hsieh discloses the preprocessing of the training material is made using discrete cosine transform (see § III).

Regarding claim 11 and 21, Hsieh discloses the preprocessing of the training material is made using a functional transform (see § III).

Regarding claim 12 and 22, Huang disclsoes the steps of evaluating the cost of a repetition using a cost function which produces a cost result, and deciding if to perform the next repetition based on the basis of said result (i.e. decision to perform the next repetition is based on the cost function evaluated at the distortion calculators 80).

Regarding claims 27 and 44, the combination of Huang and Hsieh, as recited above for claims 1 and 28, discloses the corresponding decoder to decode the encoded data (see figure 9 of Huang) – specifically, a decoding method for pre-compressed data, the method comprising the steps of:

producing a plurality of codebooks for the decompression of encoded difference data (codebooks 1 through N), wherein at least one of said codebooks contains codevectors, which

have been weighted to a specific frequency distribution (i.e. weighted to a frequency distribution pursuant to Hsieh's teachings); and,

decompressing data using the codebooks in combination, to produce a decompression result which comprises at least a plurality of significant frequencies contained in said data prior to compression (the output of the decoder, DV', comprises a plurality of significant frequencies as claimed).

Regarding claims 35 and 41, Huang discloses a cost function, which calculates the cost of using the additional repetition (i.e. decision to perform the next repetition is based on the cost function evaluated at the distortion calculators 80).

Regarding claims 45-48, the combination of Huang and Hsieh discloses the methods of claims 1 and 27 and the encoder and decoder of claims 28 and 44, which were all intended to be implemented by computer.

7. Claims 8, 9, 18, 19, 33, 34, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Hsieh as applied to claim 1 above, and further in view of U.S. Patent 5,909,513 by Liang et al. ("Liang").

Regarding claims 8, 18, 33, and 39, Huang utilizes a remaining difference to calculate the cost of further repetitions (i.e. R_1, R_2, ... R_{N-1} are used to determine the distortion at distortion calculators 80).

Huang does not appear to disclose utilizing a number of bits used for representing the difference block.

Liang discloses a method for allocating bits for representing image blocks in a VQ compression system. In particular, Liang discloses utilizing a measure of the distortion D and a weighted number of bits λR to calculate a cost of further repetitions. This cost is utilized for allocating an optimal number of bits to VQ-encoded image data. See column 5, lines 23-49 and column 8, lines 32 through column 9, line 27.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Huang and Hsieh by Liang to achieve the claimed invention, since Liang discloses that utilizing a cost function that employs both a difference (distortion) and a rate (number of bits) allows, with minimal distortion, an optimal number of bits to be allocated for an image block.

Regarding claims 9, 19, 34, and 40, Liang discloses that the number of bits is weighted (i.e. λR).

8. Claims 13, 14, 23, 24, 36, 37, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in view of Hsieh and Virtamo as applied to claim 2 above, and further in view of U.S. Patent 5,909,513 by Liang et al. ("Liang").

Regarding claims 13, 23, 36, and 42, Huang utilizes a remaining difference to calculate the cost of further repetitions (i.e. R_1, R_2, ... R_{N-1} are used to determine the distortion at distortion calculators 80).

Huang does not appear to disclose utilizing a number of bits used for representing the difference block.

Liang discloses a method for allocating bits for representing image blocks in a VQ compression system. In particular, Liang discloses utilizing a measure of the distortion D and a

weighted number of bits λR to calculate a cost of further repetitions. This cost is utilized for allocating an optimal number of bits to VQ-encoded image data. See column 5, lines 23-49 and column 8, lines 32 through column 9, line 27.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Huang and Hsieh by Liang to achieve the claimed invention, since Liang discloses that utilizing a cost function that employs both a difference (distortion) and a rate (number of bits) allows, with minimal distortion, an optimal number of bits to be allocated for an image block.

Regarding claims 14, 24, 37, and 43, Liang discloses that the number of bits is weighted (i.e. λR).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

VIKKRAM BALI
PRIMARY EXAMINER

CML
Group Art Unit 2623
4 November 2004